

Appl. S.N. 10/723,411
Amdt. Dated June 6, 2007
Reply to Office Action of 04/06/07

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The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1-5 (canceled)

6. (original) A method for segmenting a structure, comprising the steps of:

iteratively merging one or more candidate voxels into a foreground region comprising at least one or more seed voxels, wherein the candidate voxels are merged based on one or more dynamic constraints and wherein the merged candidate voxels become the seed voxels for the next iteration;

iteratively updating a queue of candidate voxels each iteration based upon the new seed voxels; and

terminating the iterative processes to generate a segmented structure comprising the foreground region.

7. (original) The method as recited in claim 6, wherein at least one of the dynamic constraints is updated based on at least one of a cross section of the region and a local statistic of the region.

8. (original) The method as recited in claim 6, wherein terminating the iterative process occurs when the queue of candidate voxels is substantially empty.

9. (original) The method as recited in claim 6, further comprising selecting an initial set of seed voxels using one or more templates.

10. (currently amended) A computerized method ~~computer program, provided on one or more computer-readable media,~~ for segmenting a structure, comprising the steps of:

~~a routine for~~ iteratively merging one or more candidate voxels into a foreground region comprising at least one or more seed voxels, wherein the candidate voxels are

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merged based on one or more dynamic constraints and wherein the merged candidate voxels become the seed voxels for the next iteration;

~~a routine for~~ iteratively updating a queue of candidate voxels each iteration based upon the new seed voxels; and

~~a routine for~~ terminating the iterative process to generate a segmented structure comprising the foreground region.

11. (currently amended) The computer program, as recited in claim 10, wherein the ~~routine-step~~ for iteratively merging updates at least one of the dynamic constraints based on at least one of a cross section of the region and a local statistic of the region.

12. (currently amended) The computer program, as recited in claim 10, wherein the ~~routine-step~~ for termination terminates the iterative processes when the queue of candidate voxels is substantially empty.

13. (currently amended) The computer program as recited in claim 10, further comprising a ~~routine-step~~ for selecting an initial set of seed voxels using one or more templates.

14. (original) An imaging system, comprising:
an imager configured to generate a plurality of signals representative of one or more structures within a volume of interest;
data acquisition circuitry configured to acquire the plurality of signals;
data processing circuitry configured to process the plurality of signals, wherein the data processing circuitry is further configured to iteratively merge one or more candidate voxels into a foreground region comprising at least one or more seed voxels, wherein the candidate voxels are merged based on one or more dynamic constraints and wherein the merged candidate voxels become the seed voxels for the next iteration, to iteratively update a queue of candidate voxels each iteration based upon the new seed voxels, and to

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terminate the iterative process to generate a segmented structure comprising the foreground region;

system control circuitry configured to operate at least one of the imager and the data acquisition circuitry; and

an operator workstation configured to communicate with the system control circuitry and to receive the plurality of signals from the data processing circuitry.

15. (original) The imaging system as recited in claim 14, wherein the data processing circuitry updates at least one of the dynamic constraints based on at least one of a cross section of the region and a local statistic of the region.

16. (original) The imaging system as recited in claim 14, wherein the data processing circuitry terminates the iterative processes when the queue of candidate voxels is substantially empty.

17. (original) The imaging system as recited in claim 14, wherein the data processing circuitry is further configured to select an initial set of seed voxels using one or more templates.

18. (original) An imaging system, comprising:

means for iteratively merging one or more candidate voxels into a foreground region comprising at least one or more seed voxels, wherein the candidate voxels are merged based on one or more dynamic constraints and wherein the merged candidate voxels become the seed voxels for the next iteration;

means for iteratively updating a queue of candidate voxels each iteration based upon the new seed voxels; and

means for terminating the iterative processes to generate a segmented structure comprising the foreground region.

Claims 19-24 (canceled)

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25. (currently amended) A method for automatically segmenting a structure from a set of image data, comprising the steps of:

selecting one or more initial regions corresponding to a structure of interest from a volume data set;

generating an edge map from the volume data set; and

iteratively segmenting the structure of interest using at least the one or more initial regions and the edge map, wherein the segmentation is based upon one or more dynamic constraints;

wherein iteratively segmenting the structure of interest comprises:

iteratively merging one or more candidate voxels into a foreground region comprising at least one or more seed voxels, wherein the candidate voxels are merged based on the one or more dynamic constraints and wherein the merged candidate voxels become the seed voxels for the next iteration;

iteratively updating a queue of candidate voxels each iteration based upon the new seed voxels; and

terminating the iterative processes to generate a segmented structure comprising the foreground region;

wherein at least one of the dynamic constraints is updated based on at least one of a cross section of the region and a local statistic of the region.

26. (original) The method as recited in claim 25, wherein generating the edge map comprises:

calculating a gradient for each of a plurality of voxels of the volume data set by determining a maximum absolute gradient component relative to each adjacent voxel; and

identifying one or more edge voxels from the plurality of voxels based upon a comparison of the gradients of each of the plurality of voxels to a threshold edge gradient.

Claims 27-28 (canceled)

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29. (currently amended) The method as recited in claim 27 25, wherein terminating the iterative processes occurs when the queue of candidate voxels is substantially empty.

30. (currently amended) The method as recited in claim 27 25, further comprising selecting an initial set of seed voxels using one or more templates.

31. (original) The method as recited in claim 25, wherein selecting one or more initial regions comprises:

providing at least one of a geometrical template and a functional template, wherein each template represents at least one characteristic of the structure of interest; and

identifying one or more regions of the structure of interest based upon the similarity of the respective characteristic in the regions and the provided templates.

32. (original) The method as recited in claim 31, wherein the geometrical template comprises a geometrical shape.

33. (original) The method as recited in claim 31, wherein the functional template comprises at least one of a statistical homogeneity criteria, an intensity distribution, an intensity level, and a pattern.

34. (currently amended) ~~A computer program, provided on one or more computer readable media,~~ computerized method for automatically segmenting a structure from a set of image data, comprising the steps of:

~~a routine for~~ selecting one or more initial regions corresponding to a structure of interest from a volume data set;

~~a routine for~~ generating an edge map from the volume data set; and

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~~a routine for~~ iteratively segmenting the structure of interest using at least the one or more initial regions and the edge map, wherein the segmentation is based upon one or more dynamic constraints;

wherein the routine for iteratively segmenting the structure of interest iteratively merges one or more candidate voxels into a foreground region comprising at least one or more seed voxels, wherein the candidate voxels are merged based on the one or more dynamic constraints and wherein the merged candidate voxels become the seed voxels for the next iteration, iteratively updates a queue of candidate voxels each iteration based upon the new seed voxels, and terminates the iterative processes to generate a segmented structure comprising the foreground region..

35. (currently amended) The computer program as recited in claim 34, wherein the ~~routine-step~~ for generating calculates a gradient for each of a plurality of voxels of the volume data set by determining a maximum absolute gradient component relative to each adjacent voxel and identifies one or more edge voxels from the plurality of voxels based upon a comparison of the gradients of each of the plurality of voxels to a threshold edge gradient.

Claim 36 (canceled)

37. (currently amended) The computer program as recited in claim ~~36~~ 34, wherein the ~~routine-step~~ for iteratively segmenting updates at least one of the dynamic constraints based on at least one of a cross section of the region and a local statistic of the region..

38. (currently amended) The computer program as recited in claim ~~36~~ 34, wherein the ~~routine-step~~ for iteratively segmenting terminates the iterative processes when the queue of candidate voxels is substantially empty.

39. (currently amended) The computer program as recited in claim ~~36~~ 34, wherein the ~~routine-step~~ for selecting identifies one or more regions of the

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structure of interest based upon the similarity of one or more characteristics of the regions and one or more templates, wherein the templates comprise at least one of a geometrical template and a functional template and wherein each template represents at least one respective characteristic of the structure of interest.

40. (currently amended) An imaging system, comprising:

an imager configured to generate a plurality of signals representative of one or more structures within a volume of interest;

data acquisition circuitry configured to acquire the plurality of signals;

data processing circuitry configured to process the plurality of signals, wherein the data processing circuitry is further configured to select one or more initial regions corresponding to a structure of interest from a volume data set, to generate an edge map from the volume data set, and to iteratively segment the structure of interest using at least the one or more initial regions and the edge map, wherein the segmentation is based upon one or more dynamic constraints, wherein the data processing circuitry generates the edge map by calculating a gradient for each of a plurality of voxels of the volume data set by determining a maximum absolute gradient component relative to each adjacent voxel and by identifying one or more edge voxels from the plurality of voxels based upon a comparison of the gradients of each of the plurality of voxels to a threshold edge gradient;

system control circuitry configured to operate at least one of the imager and the data acquisition circuitry; and

an operator workstation configured to communicate with the system control circuitry and to receive the plurality of signals from the data processing circuitry.

Claim 41. (canceled)

42. (currently amended) The imaging system as recited in claim 40, wherein the data processing circuitry iteratively segment the structure of interest by iteratively merging one or more candidate voxels into a foreground region comprising at least one or more seed voxels, wherein the candidate voxels are merged based on the one or more

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dynamic constraints and wherein the merged candidate voxels become the seed voxels for the next iteration, iteratively updating a queue of candidate voxels each iteration based upon the new seed voxels, and terminating the iterative processes to generate a segmented structure comprising the foreground region.

43. (original) The imaging system as recited in claim 42, wherein the data processing circuitry is configured to update at least one of the dynamic constraints based on at least one of a cross section of the region and a local statistic of the region.

44. (original) The imaging system as recited in claim 42, wherein the data processing circuitry is configured to terminate the iterative processes when the queue of candidate voxels is substantially empty.

45. (original) The imaging system as recited in claim 40, wherein the data processing circuitry selects one or more initial regions by identifying one or more regions of the structure of interest based upon the similarity of one or more characteristics of the regions and one or more templates, wherein the templates comprise at least one of a geometrical template and a functional template and wherein each template represents at least one respective characteristic of the structure of interest.

Claim 46 (canceled)